between the Skiddaw slate and the overlying Volcanic Series, and the existence of the chain of faults which everywhere separates the two groups. Mr. Ward relies on the fact that beds of volcanic ash occur on the upper part of the Skiddaw slate. This shows that volcanic activity began before the deposition of the Skiddaw slate was completed, but it scarcely proves that no upheaval and denudation attended the commencement of the volcanic outbursts. Volcanic activity and elevation are so intimately connected that it may well be that the early discharges were the heralds of an upward movement of the rocks. The author indeed admits thus much, and believes that slow upheaval did attend the advent of volcanic activity, and that the bulk of the volcanic products are terrestrial. We should be inclined to go further, and to suggest that a long period may have followed the first volcanic outbreaks, during which the Skiddaw Slate was crumpled up and brought within the range of atmospheric denudation. Any volcanic deposits formed during this interval would of course be removed by denudation. By the time the volcanoes had reached their full growth, a land-surface, diversified by hill and valley, may have been produced, and when the volcanic products were showered down on this uneven floor, heaps of ash and sheets of lava would every here and there abut against banks of Skiddaw Slate, in a manner that produces to us a deceptive appearance of faulting. We give this hint merely for what it is worth, and have no wish to throw any doubt on the possibility of the boundary being such as the map represents it to be; indeed, instances about which there can be little doubt might be quoted, where two groups of rocks are parted by just such a jagged line of faults as that which Mr. Ward has drawn in the present case.

The book is liberally illustrated by maps and sections, and the bibliographical list of works relating to the geology of the district is a most welcome addition.

We cannot but feel that a great mistake has been made in the map which the memoir is intended to illustrate. As a typographical piece of work it is unsurpassed, but it is its excellence in this respect that makes it unsuited for geological purposes. The reliefs of the surface are admirably brought out by the hill shading, but in order to produce the desired effect, the hatching has been made so dark that in many places it is difficult, if not impossible, to distinguish the geological colouring and signs. The Ordnance Survey issue in the northern counties another set of one-inch maps, with contour-lines in the place of hill-shading, and had one of these been employed to receive the geological colouring, the very serious difficulty just mentioned would not have arisen. We have no hesitation in saying from actual experience in the use of both classes of maps, that had plain copies been used, the value of the map would have been well-nigh doubled.

Before concluding we would remonstrate with the author on his italics; the book bristles with them, till it reminds one of a school-girl's letter. This indiscriminate use of emphasis destroys that repose which is one of the chief charms of style, and in a very large number of cases there is no necessity for it, for the meaning would be perfectly clear without the adventitious aid of a variation in the type.

A. H. G.

## VENNOR'S "ACCIPITRES OF CANADA"

*Our Birds of Prey; or, The Eagles, Hawks, and Owls of Canada.* By Henry G. Vennor, F.G.S. With Thirty Photographic Illustrations by W. Notman. 4to, pp. i.–viii., 1–154, plates i.-xxx. (Montreal: Dawson Brothers; London: Sampson Low and Co., 1876.)

SO little is really known respecting the ornithology of Canada that one cannot but welcome with great satisfaction such a substantial addition to our knowledge as has been given by Mr. Vennor in the present work. As a geologist employed on the survey of Canada the author has enjoyed unrivalled opportunities for studying many of the birds in the field, and although the fulfilment of his duties has prevented him from devoting his entire attention to ornithology, yet he has evidently kept his eyes open, and the work before us embodies the result of thirteen years' observation. It is to be regretted that at present Mr. Vennor has only written on the birds of prey, and it is to be hoped that he will continue his labours on the rest of the birds of Canada. The species themselves included in the present work are twenty-seven in number, and on all these very complete information seems to be given respecting their distribution in the Canadian dominion, including not only a *résumé* of the hitherto published facts, but giving also a large amount of new information. Excellent accounts of the habits of the birds are added, chiefly from the personal observations of the author himself, and each article concludes with the description of the species in which the colours of the soft parts are always given; this is a feature often omitted by Messrs. Baird, Brewer, and Ridgway in their recently-published "History of North American Birds." Mr. Vennor does not include among the species fully treated of, the Common Turkey Buzzard (*Rhinogryphus aurea*), which hardly extends to Canada in its northern range, though it is a regular summer visitant to "the extensive flats near Chatham and Lake St. Clair," while further to the westward it occurs frequently on the line of the forty-ninth parallel. Of the Barn Owl (*Strix flammea*), Mr. Vennor says that there is no authentic record of its occurrence in Canada, but we notice in Mr. Bowdler Sharpe's paper on the "Geographical Distribution of Barn Owls," published in Mr. Rowley's *Ornithological Miscellany*, that the British Museum contains a specimen from the neighbourhood of Toronto, collected near that city by Mr. James Whitely, who has resided there for some years, and has sent many interesting birds to this country. Other small points might also be alluded to in which we think further consideration on the author's part desirable, such as the relations between *Falco candicans* and *F. labradorus*, *Circus cinereus* and *C. hudsonius*, &c. We are not disposed to quarrel with the photographic illustrations to the book, which are excellent specimens of photography, although this mode of illustrating scientific works does not commend itself to our fancy. At any rate, however, a good photograph is better than a bad plate, especially in a work like the present, where the author's chief aim has been to give such a figure as may render the identification of the species more easy to the student, his object being, in his own words, "a work of practical utility, not a mere exhibition of pretty photographs." As a new worker in the vast field

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of ornithology we welcome Mr. Vennor, and only trust that many years will not elapse before he gives us a second instalment on the birds of Canada.

## *OUR BOOK SHELF*

*The Use of the Spectroscope in its Application to Scientific and Practical Medicine.* By Emil Rosenberg, M.D. (New York: Putnam, 1876.)

THIS is an essay on the use of the spectroscope which obtained the Stevens triennial prize for 1876, awarded by the College of Physicians and Surgeons.

It treats mainly of the absorption spectra of blood in its normal state and after being acted upon by other substances. The first chapter gives a very short account of the optics of the spectroscope, which the author does not pretend to treat fully; then follows a short notice of the emission spectra of the metals. The absorption bands of oxyhæmoglobin (scarlet cruorine) and their change to the one reduction band of hæmoglobin (purple cruorine) by the abstraction of oxygen, discovered by Prof. Stokes, then comes in for recognition. The remainder of the book is chiefly on the absorption spectrum of blood with reference to forensic medicine and its spectrum after the introduction of foreign matters and gases.

It appears from the numerous references that the author has compiled this essay from books and papers rather than from observation, and the authors referred to are with few exceptions Germans. We think the book is well suited for the perusal and reference of the medical profession and others taking up this special subject.

*Journey in the Caucasus, Persia, and Turkey-in-Asia.* By Lieut. Baron Max von Thielmann. Translated by Charles Heneage, F.R.G.S. Two vols. Map and Woodcuts. (London, Murray).

BARON THIELMANN's journey, which was made in the year 1872, embraced all the Caucasian region, much of the western shore of the Caspian Sea, with the long stretch of country between Tabrez, Hillah, and Beyrout. Though this is a region about which a good deal has been written, the Baron's narrative will be found to contain a considerable addition to our knowledge. His observations on the people and the antiquities of the countries traversed are especially valuable, while the work contains as well much interesting topographical and geographical information. The Baron is an exceedingly pleasant travelling companion, and as Mr. Heneage has made a thoroughly readable translation, the work will be found of value both to the stay-at-home reader and as a guide to the intending tourist.

## *LETTERS TO THE EDITOR*

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

### Structure and Origin of Meteorites

IN the abstract of Mr. H. C. Sorby's lecture "On the Structure and Origin of Meteorites," given in NATURE, vol. xv., p. 495, in reference to the subject of glass globules observed by the lecturer in certain meteorites, the condition in which glassy particles given off by terrestrial volcanoes occur, is contrasted with that produced artificially in furnace slag by the action of a strong blast of hot air or steam. In the furnace slag "pear-shaped globules, each having a long hair-like tail," are described as being formed, whereas in the case of volcanoes the glassy particles are said, when given off, to be immediately solidified on entering the atmosphere, and to remain as mere fibres, as Pele's hair, or more or less irregular laminæ, like pumice dust. In fact, the formations in the two instances are closely similar. In the crater of Kilauea, in the Island of Hawai, wherever the well-known Pele's hair is in process of formation, long-tailed pear-shaped globules are formed in abundance, and a large proportion of the "hairs" are to be found with larger or smaller globules in connection with their ends.

I saw the formation of Pele's hair in two places in the crater.

In the one instance the formation occurred at the margin of one of the small lakes of molten lava. The lake was inclosed by a range of low cliffs, against the bases of which the waves of the extraordinarily fluid lava were constantly surging, being kept in perpetual commotion by the violent discharge of gases from beneath. The waves splashed up against the cliffs and spray and large drops were thrown into the air, and on the leeward side of the lake were driven by the wind over the top of the cliff so as to fall on a level platform of rock which was even with its summit.

The platform appeared as if melted pitch had been splashed out all over it, and was covered with small masses of pitch-like looking lava. Those of the masses which had evidently completely solidified before reaching the platform in their fall were pear-shaped, whilst in other cases where hardening had not been complete, the elongate masses falling in the soft condition had become flattened into irregular shapes, which showed more or less evident traces of the coiling of the masses as they fell.

All the masses had tails, some short and spike-like, others long and hair-like, and there was every gradation between stiff fine rods of transparent lava and the perfectly elastic hair of which a handful could readily be raked together with the fingers on the platform in a very short time.

In the other instance, the Pele's hair was seen by me around one of the small hollow cones or lava fountains which are constantly formed in the crater. The cone was not active at the time I saw it. It was surrounded with the small lava masses thrown out by it and forming a deposit closely similar to that formed at the margin of the lake, except that numerous larger lumps occurred amongst the smaller ones.

Very striking objects in the crater are large bubbles which have been formed in the lava when molten by the escaping gases. The surfaces of the bubbles are composed of extremely thin transparent laminæ, which look just like thin green bottle glass. Such bubbles are encountered at almost every step on the floor of superficially solidified lava, on which the visitor walks in the crater.

A remarkable peculiarity of the Hawaian lava is its extreme fluidity when in the molten condition. This property has brought about the unusual form of the great mountains of the island composed of it, which have so gradual a slope that the observer can hardly credit their great height when viewing them from the sea.

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### On the Simplest Continuous Manifoldness of Two Dimensions and of Finite Extent

IT could hardly fail to be instructive if Mr. Frankland would explain the following obvious paradox in his theory (NATURE, vol. xv., p. 515). Let two "straight lines" XOX′, LOL′, make an angle XOL other than a right angle, and consider the shortest line PN from a moving point P in LL′ to XX′; from the assumptions, this is a "straight line" perpendicular to XX′. As P moves from O along OL, it will by and by, according to the theory, be at L′; that is, on the other side of XX′, if our "straight lines" are "of the same shape all along." Now, to put it algebraically, how does the perpendicular come to change sign? It does not pass through infinity, for the manifoldness is of finite extent: it does not vanish except when P is at O; and though it is conceivable in itself that N should travel to a maximum distance along OX and come back again while P moves on, yet this contradicts our principal assumption, for each perpendicular will then have two points in common with LL′. Is a door of escape to be found through any interpretation of "continuous"? Or, while "there is nothing self-contradictory in the definition," is there something in it contradictory of the superposition-principle by means of which its consequences are worked out?

The theory is partly exemplified upon the surface of revolution got by bending a hemisphere till it closes up. Correspondence is pretty close as to points in the equator and the simpler figures symmetrical to it.

C. J. MONRO

Hadley, Barnet

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